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Ward et al.

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- (54) **THROTTLE PEDAL ASSEMBLY**
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- (*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 488 days.

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B60K 26/04 (2006.01)
F02D 11/04 (2006.01)
G05G 1/44 (2008.04)
B60K 26/02 (2006.01)
- (52) **U.S. Cl.**
CPC **B60K 26/04** (2013.01); **F02D 11/04** (2013.01); **G05G 1/30** (2013.01); **B60K 26/02** (2013.01); **B60K 2026/043** (2013.01); **G05G 1/44** (2013.01)

(58) **Field of Classification Search**
CPC G05G 1/30; G05G 1/44; B60K 26/02
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

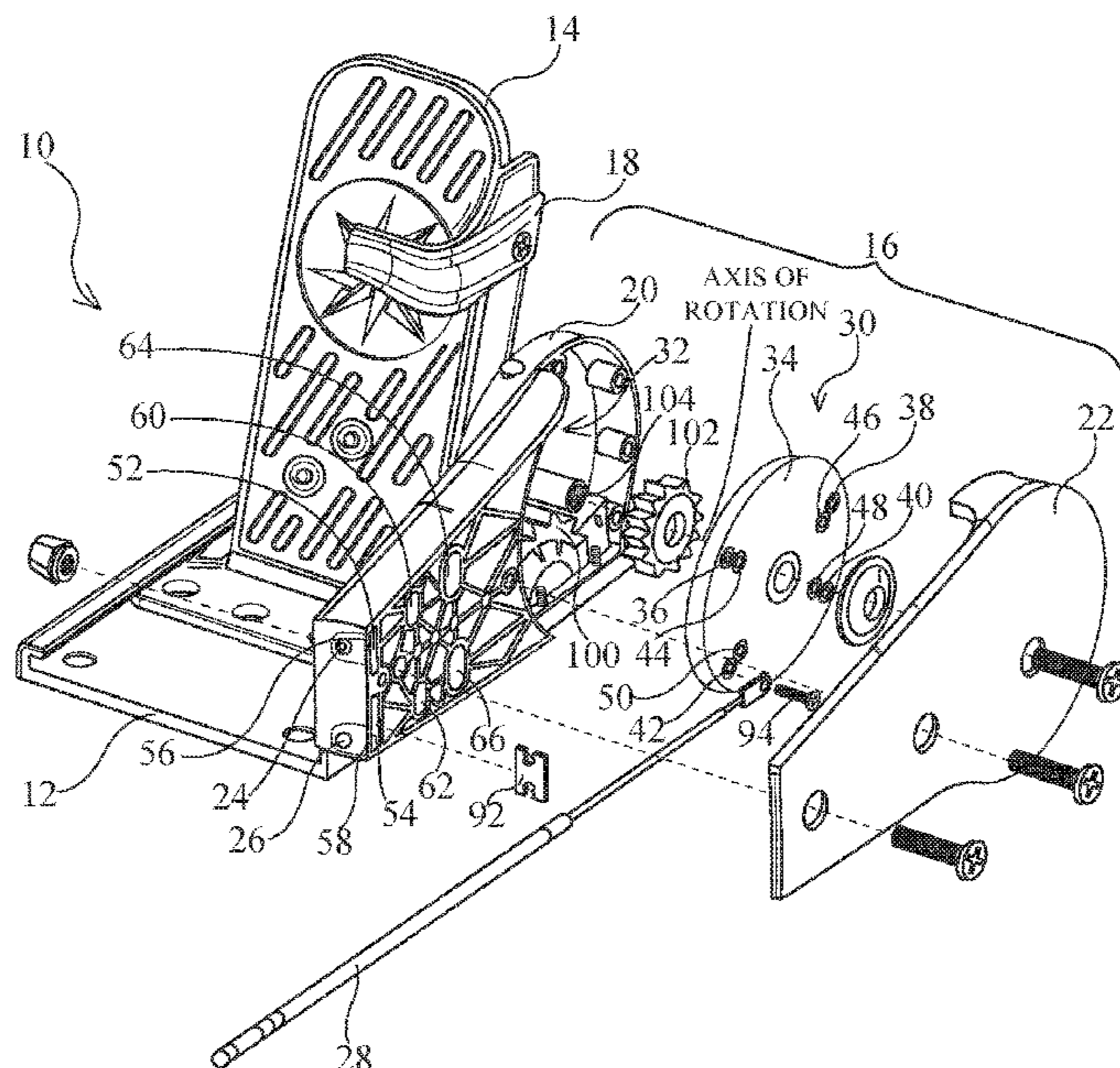
2,985,031 A *	5/1961	Bennett	B63H 21/213 74/109
3,002,398 A	10/1961	Beamer	
4,631,034 A *	12/1986	Menne	B63H 25/02 74/471 R
5,138,899 A *	8/1992	Katagiri	B60T 7/06 74/529
5,529,296 A	6/1996	Kato et al.	
5,649,606 A *	7/1997	Bebernes	B62D 11/183 180/6.48
5,865,068 A *	2/1999	Huntley	G05G 1/30 74/513
6,008,797 A *	12/1999	Sanderson	G05G 1/30 345/157
6,058,796 A	5/2000	Huntley	
6,220,112 B1 *	4/2001	Graham	F16H 61/22 74/513

(Continued)

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(57) **ABSTRACT**
A throttle pedal assembly comprises a base, a pedal pivotably mounted on the base, and a gear box coupled to the pedal. The gear box has a throttle wheel with a plurality of throttle cable terminal attachment locations and the gear box has a plurality of throttle cable mounting locations. A throttle cable is selectively and releasably attached to one of said plurality of throttle cable terminal attachment locations, and the throttle cable is selectively and releasably attached to one of said plurality of throttle cable mounting locations.

8 Claims, 11 Drawing Sheets



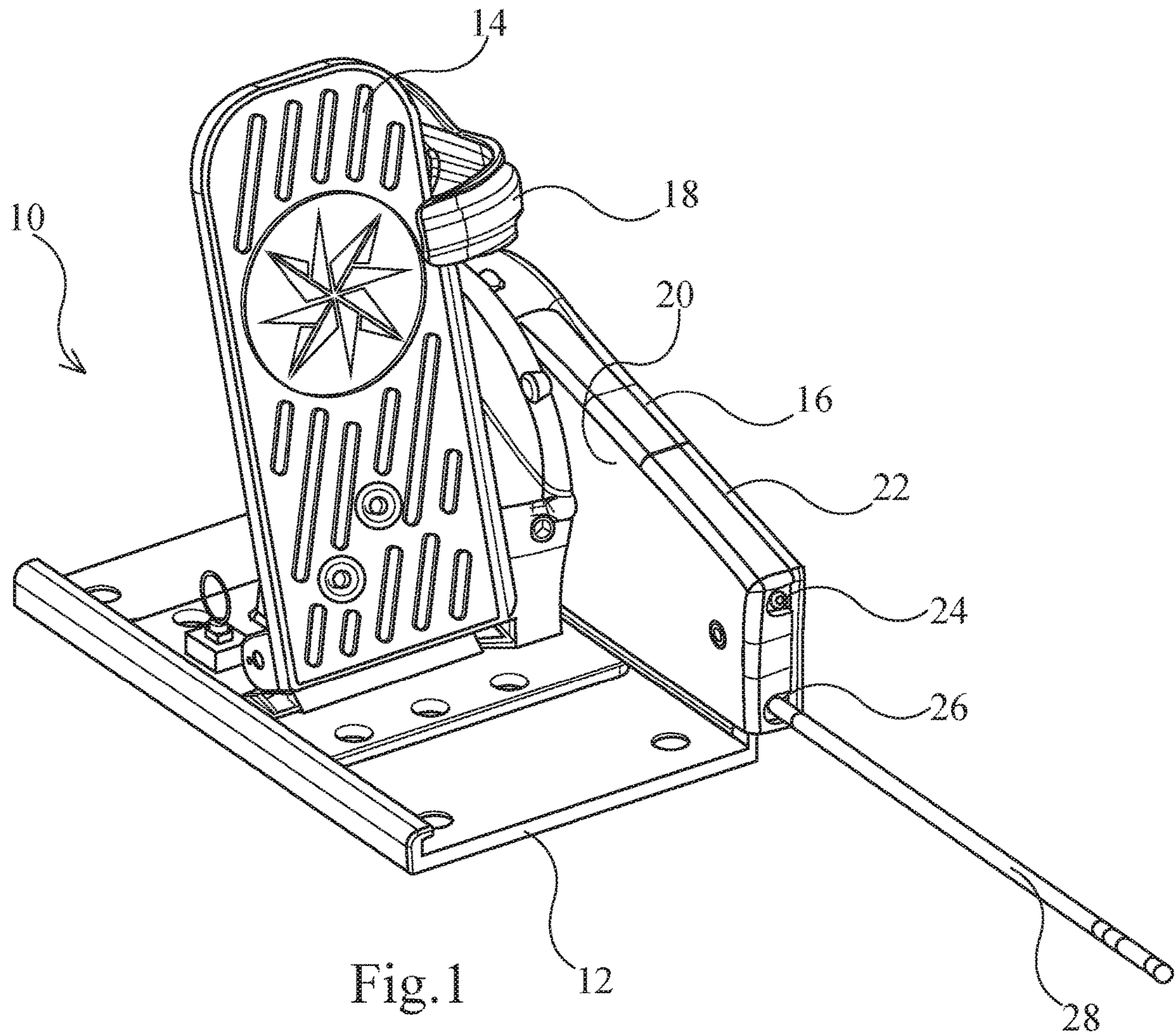
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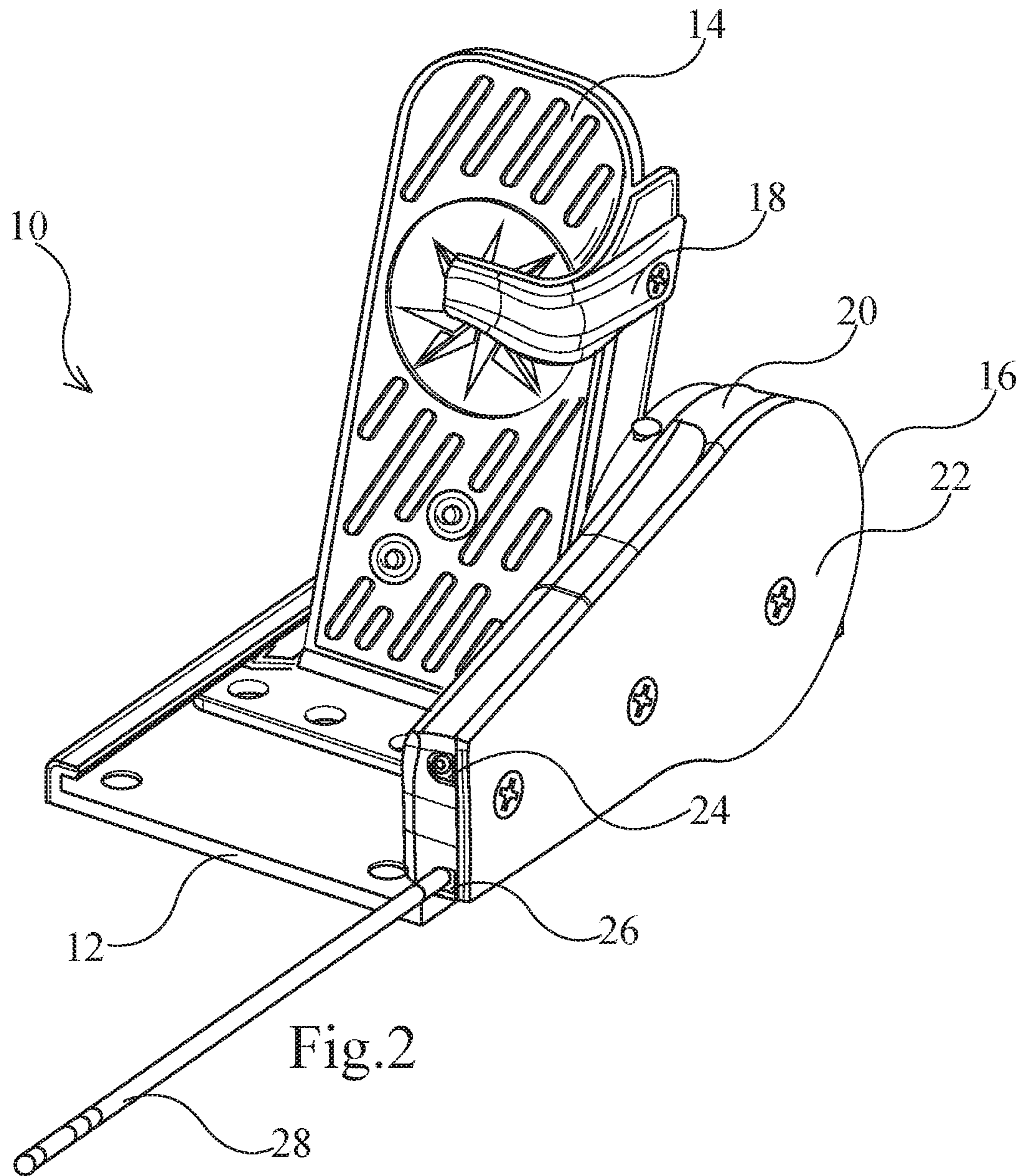
References Cited

U.S. PATENT DOCUMENTS

6,223,623 B1 * 5/2001 Vance G05G 1/30
74/513
6,364,047 B1 * 4/2002 Bortolon B60K 23/02
74/513
6,389,927 B1 5/2002 Willemsen
6,536,300 B1 * 3/2003 Gonring G05G 1/405
74/513
2004/0130156 A1 * 7/2004 Hartman H02J 7/32
290/1 A
2005/0016318 A1 * 1/2005 Allard B60K 26/021
74/512
2009/0038431 A1 2/2009 Willemsen et al.
2009/0223319 A1 9/2009 Choi
2011/0132134 A1 * 6/2011 Kim F02D 11/02
74/514
2011/0289666 A1 * 12/2011 Owen, Jr. A47K 13/10
4/246.3
2015/0355669 A1 * 12/2015 Dumitrescu G05G 5/08
74/478
2018/0056949 A1 * 3/2018 Pennala B60T 7/06
2021/0096590 A1 * 4/2021 Petro-Roy G05G 1/38

* cited by examiner





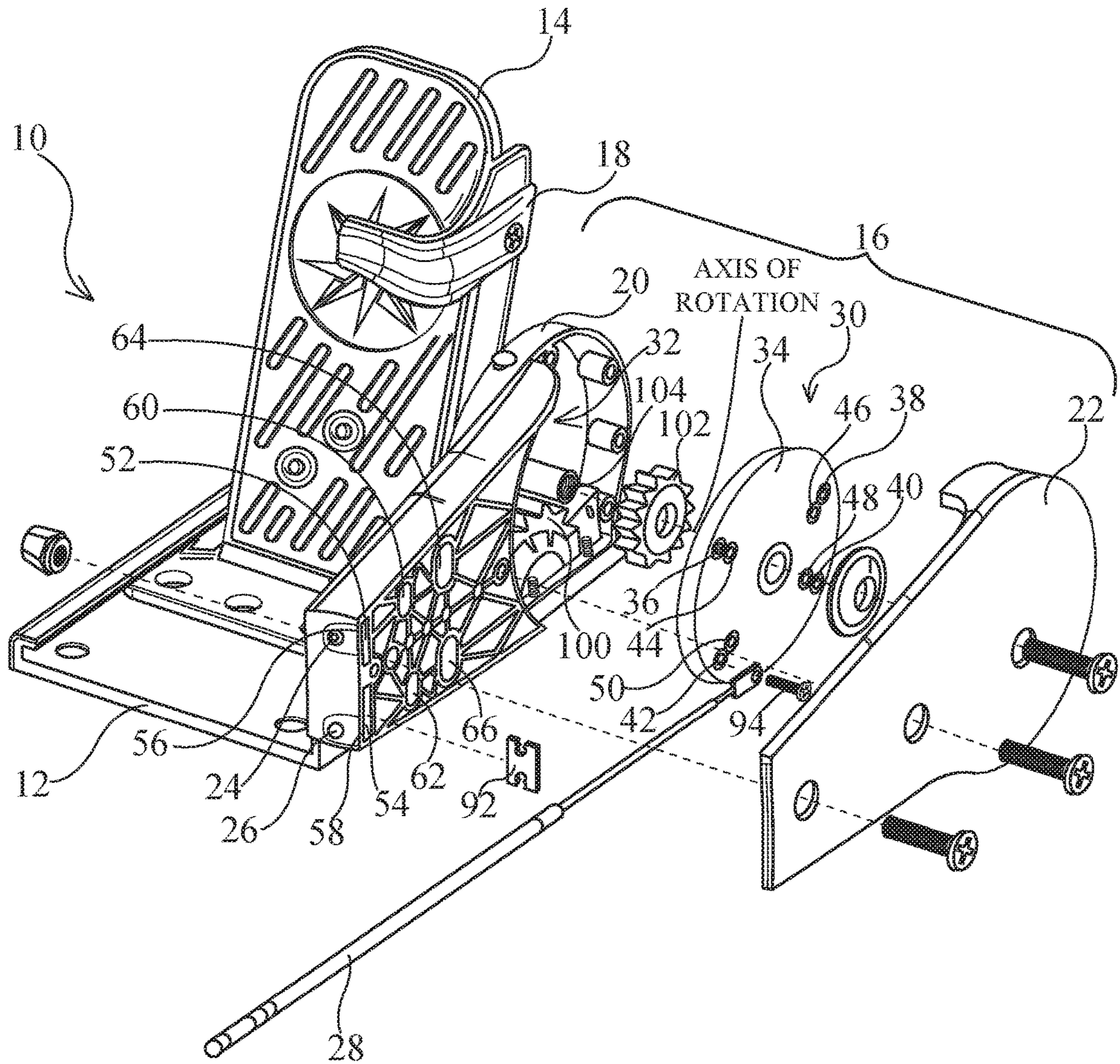


Fig.3

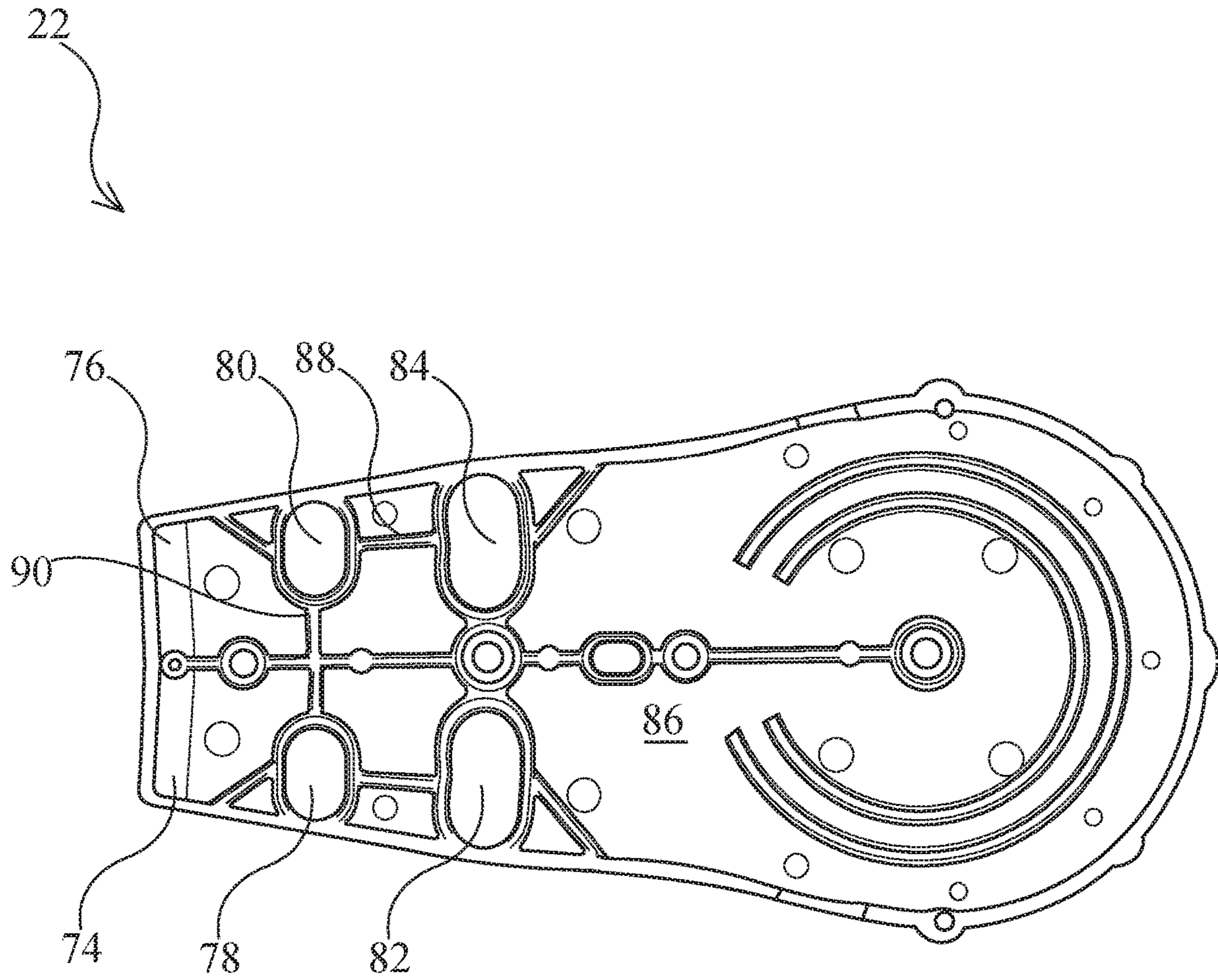


Fig.5

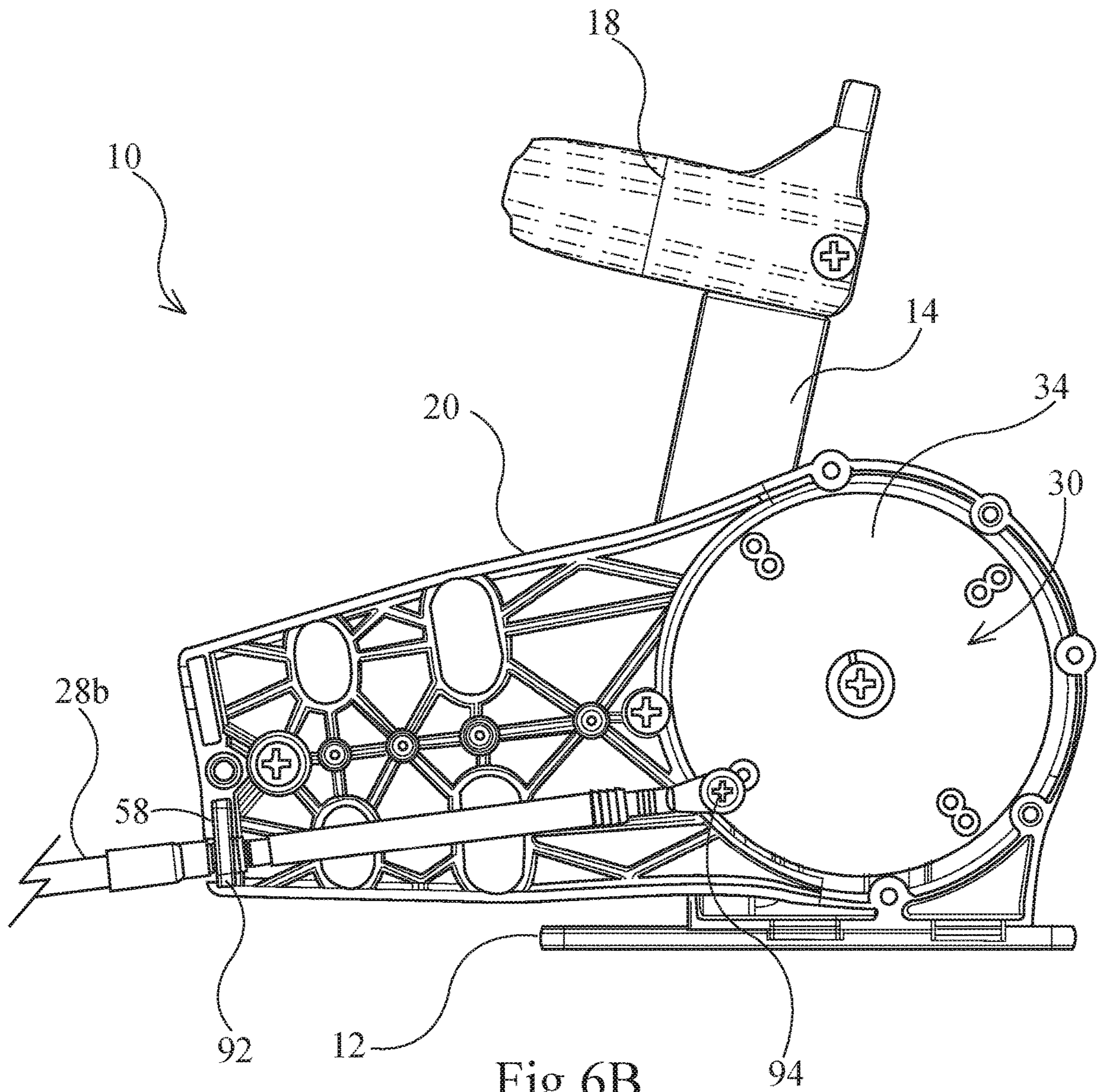


Fig. 6B

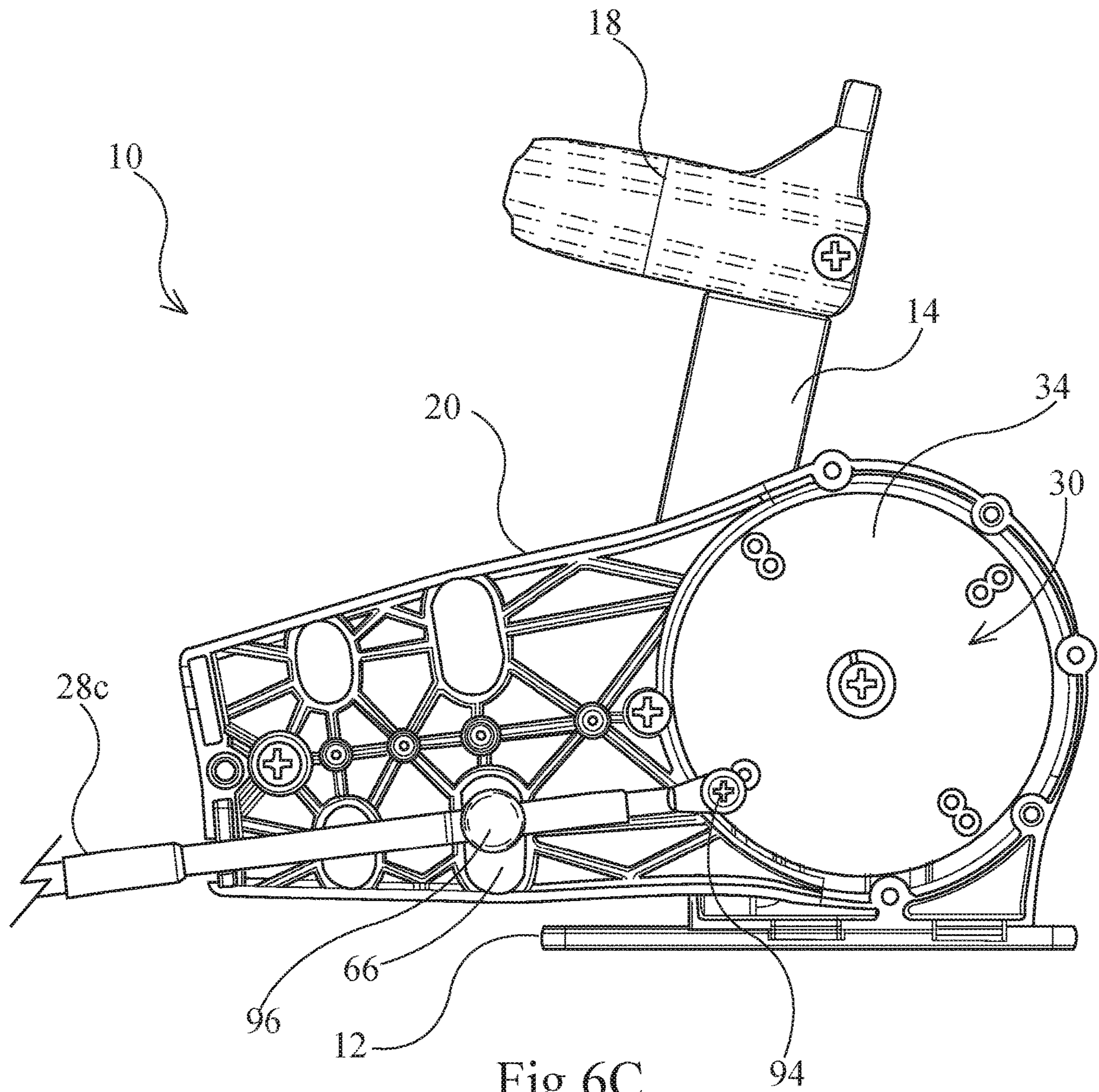


Fig.6C

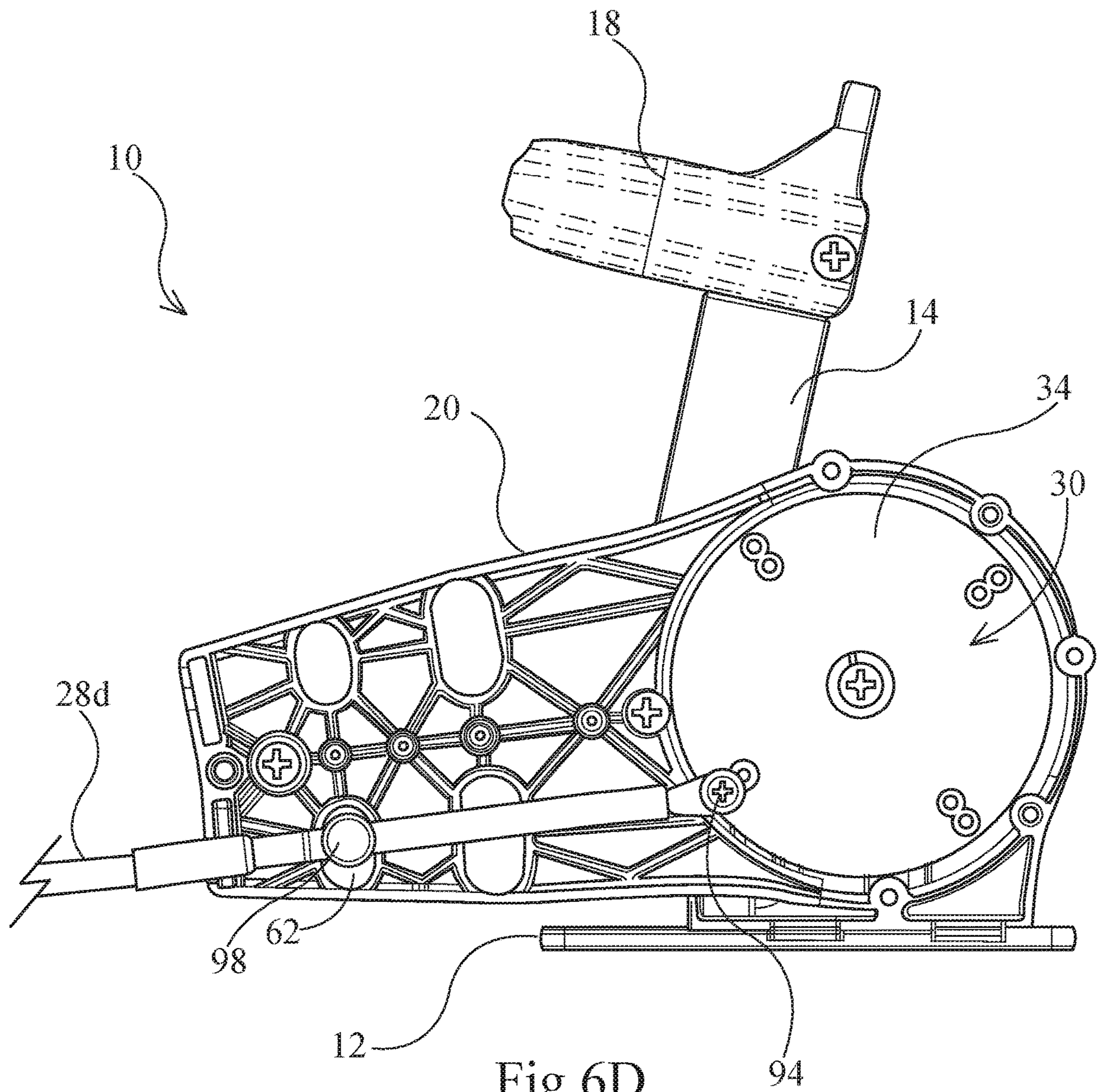


Fig. 6D

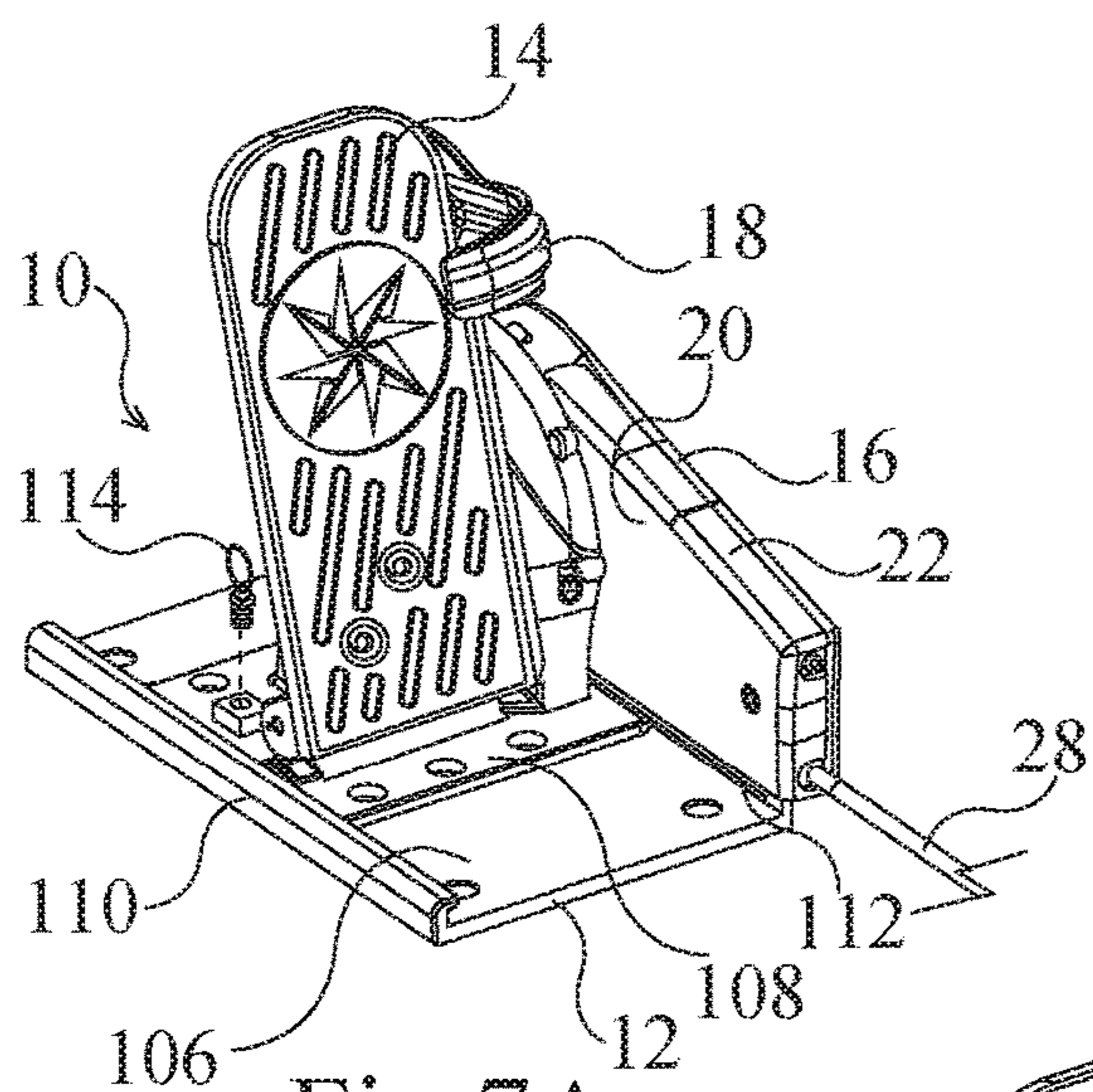


Fig. 7A

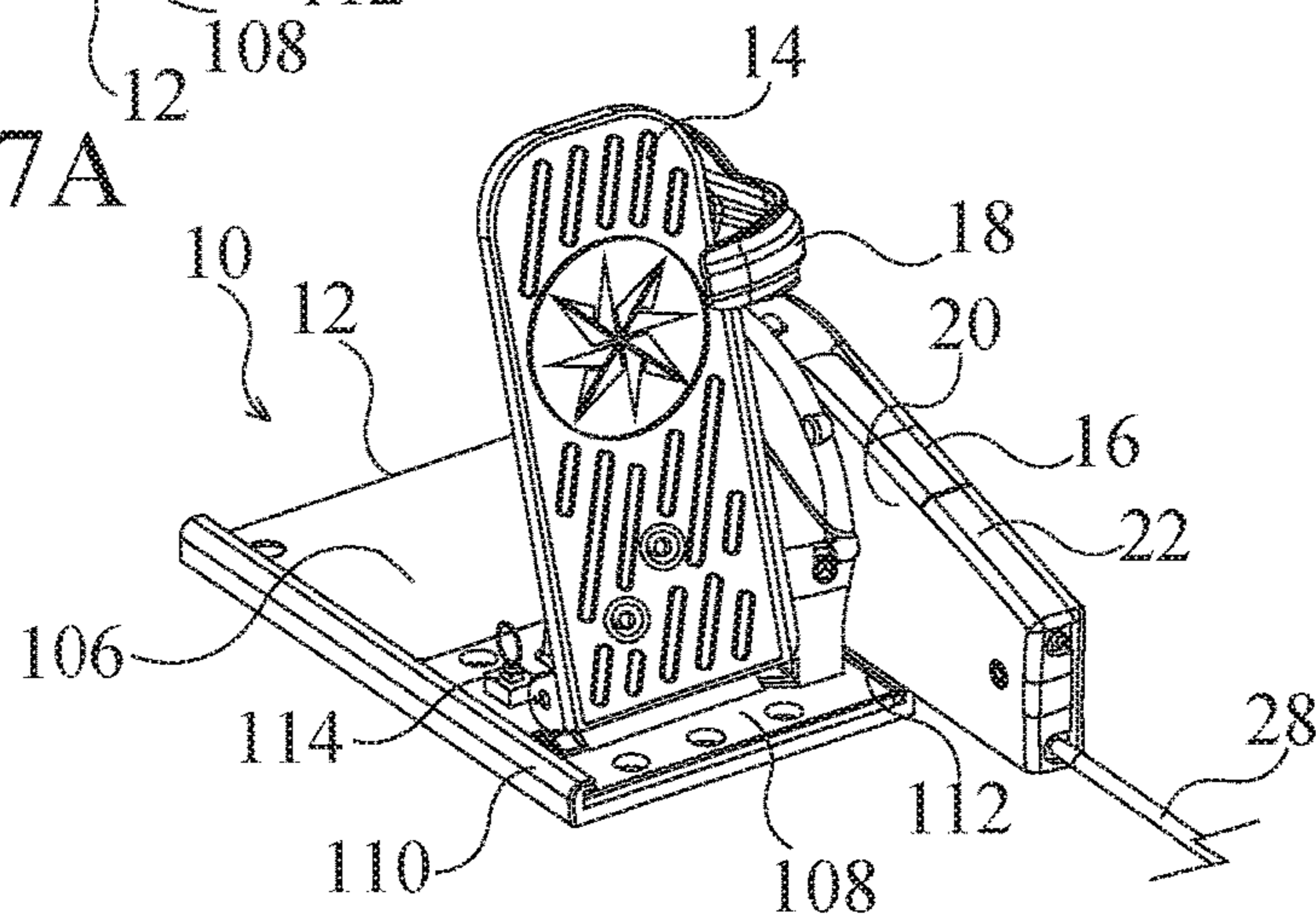


Fig. 7B

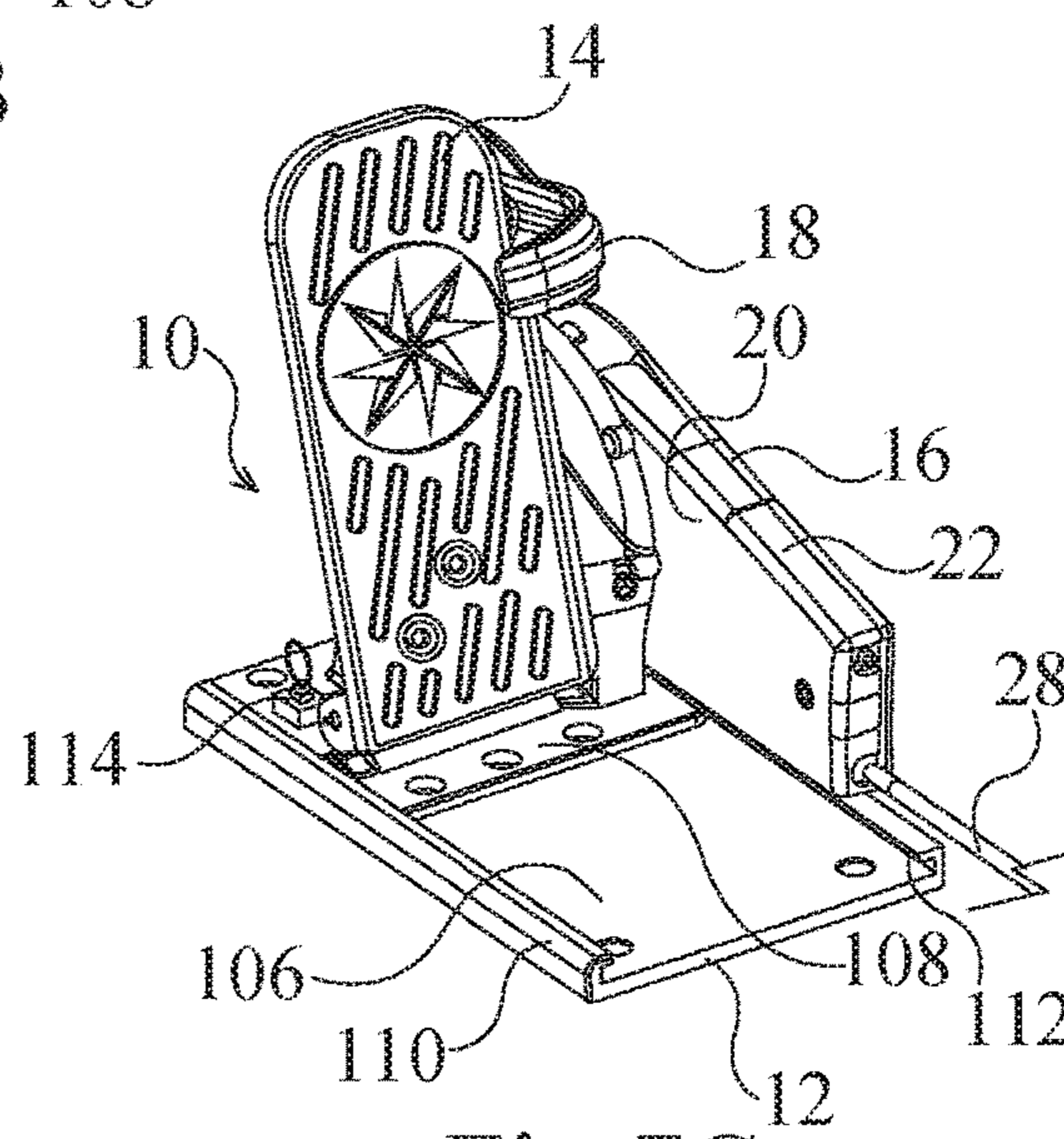


Fig. 7C

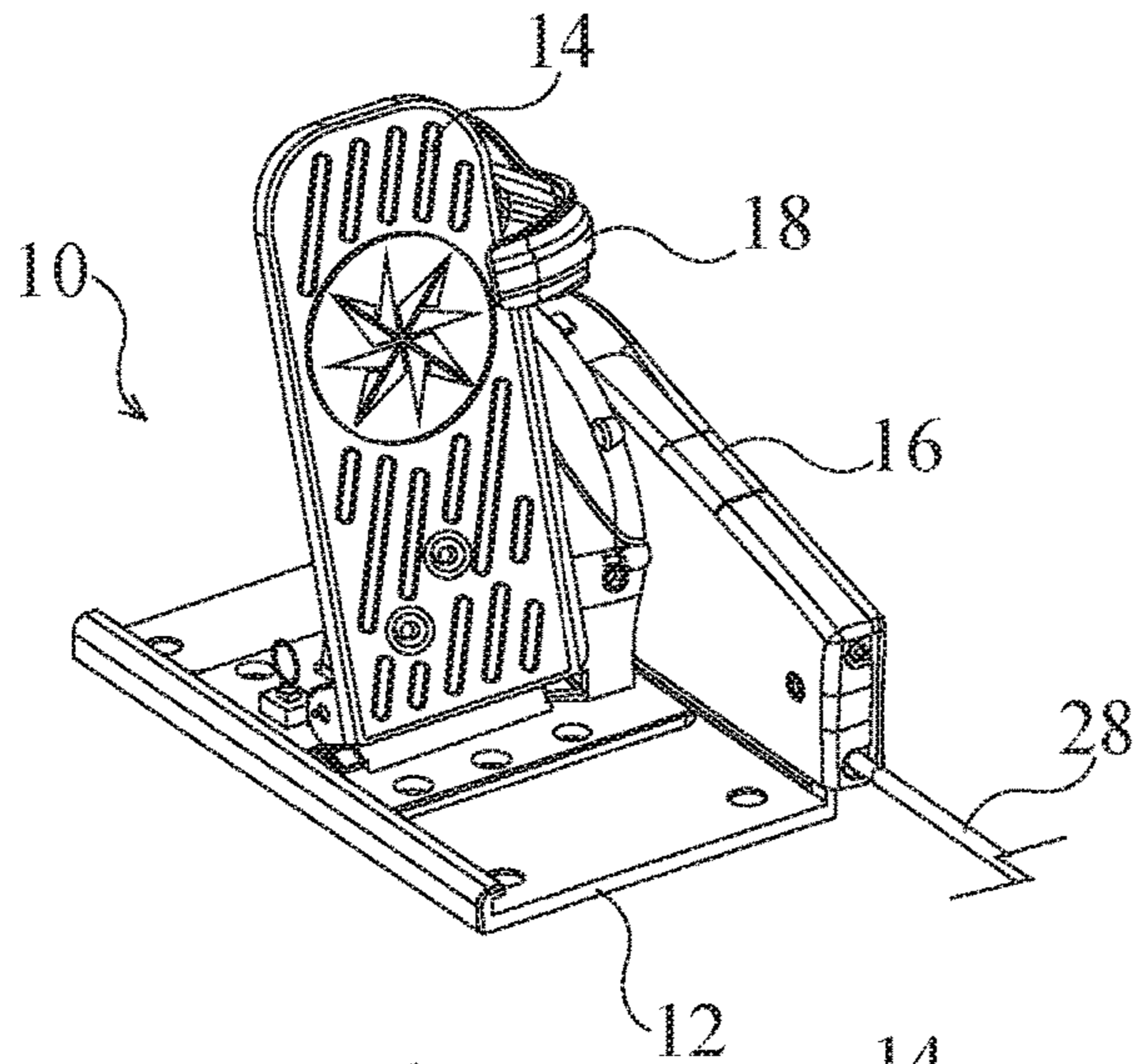


Fig. 8A

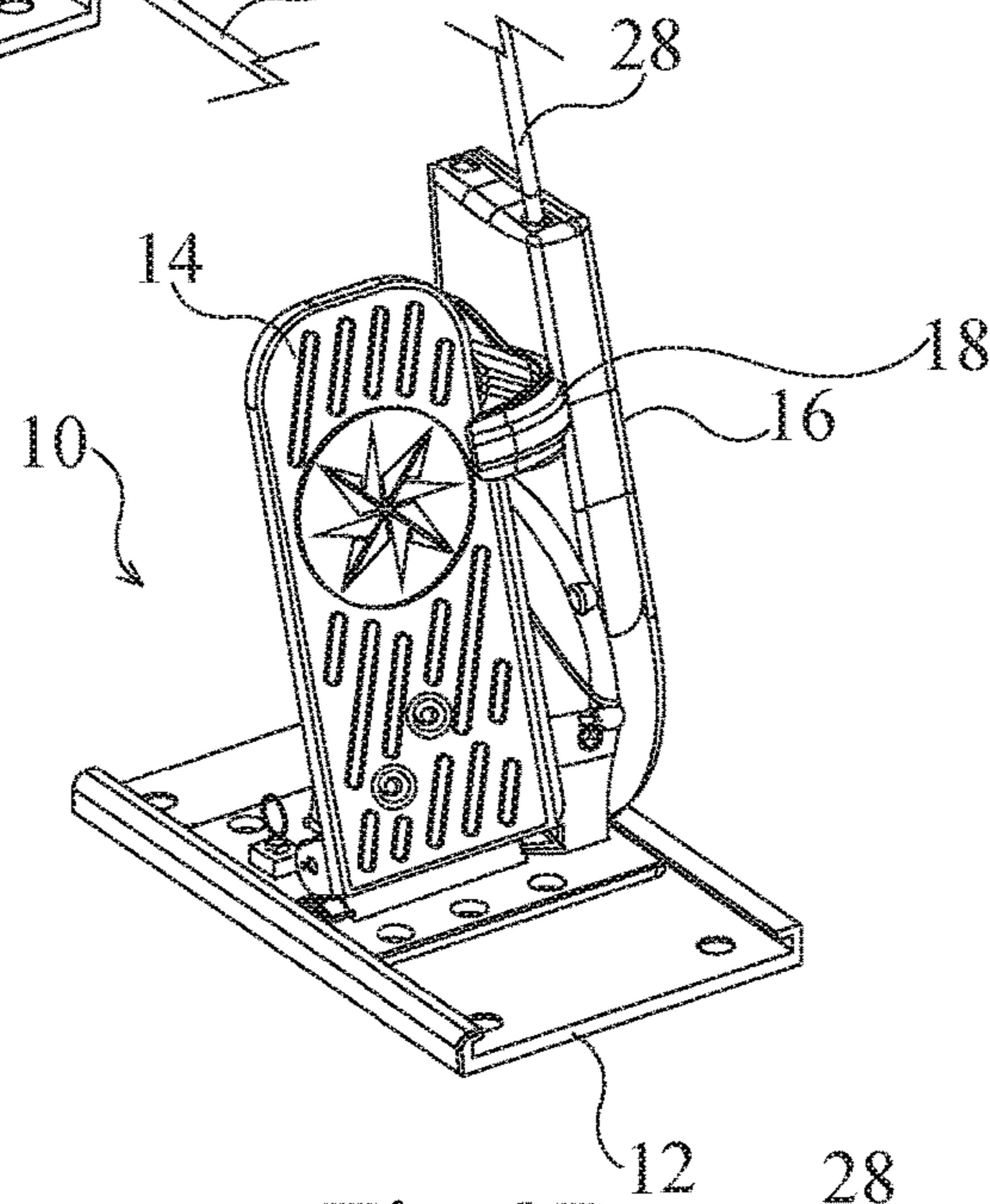


Fig. 8B

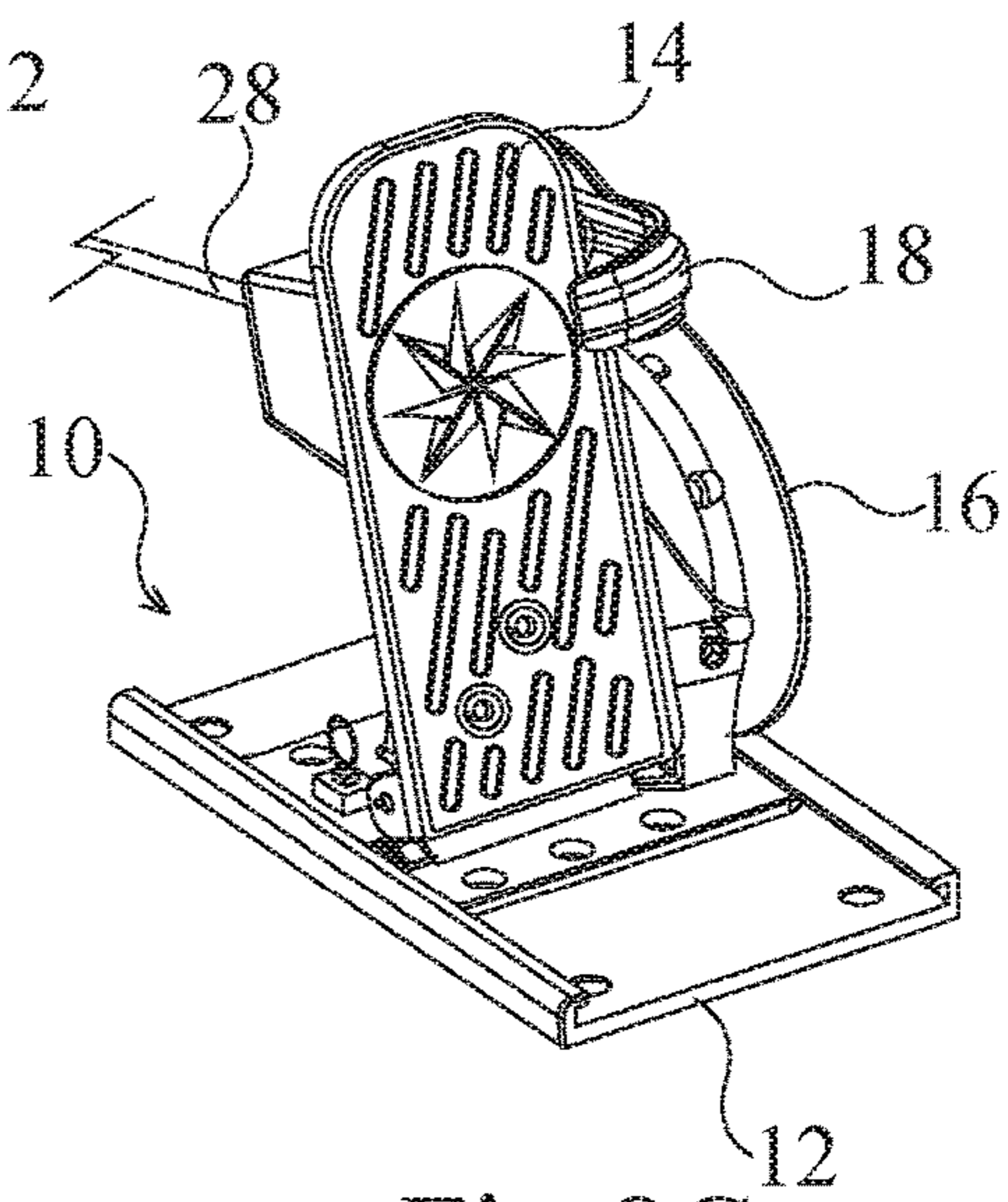


Fig. 8C

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THROTTLE PEDAL ASSEMBLY

This application claims priority of U.S. Provisional Application No. 62/725,178, filed Aug. 30, 2018, the entire content of which is hereby incorporated by reference.

TECHNICAL FIELD

The present disclosure relates to a throttle pedal assembly and, in particular, to a throttle pedal assembly having a throttle wheel with a plurality of throttle cable terminal attachment locations.

U.S. Pat. No. 2,985,031 which issued on May 23, 1961, in the name of Bennett discloses a remote control to be actuated by foot for control of outboard motors. The remote control comprises a base and a plurality of adjustable legs mounted on the base. There is a pad on each leg. The pads are substantially universally adjustable relative to the legs for application to a contoured surface. There is a pivoted foot treadle mounted on the base, a sector gear on the base, a link connecting said foot treadle to said sector gear to oscillate the latter, a rack, and means on the base to rectilinearly guide and constrain the rack. The sector gear is in engagement with the rack to move the same. There is a motor control cable secured to the rack for actuation thereby in conformance to the motion of the treadle.

U.S. Pat. No. 6,058,796 which issued on May 9, 2000, in the name of Huntley discloses a foot throttle for boats. An eccentric is rotated by operation of a foot pedal and wherein the eccentric is biased directly against an adjustable limiter thus eliminating imprecise positioning of the throttle caused by loose tolerances in the pedal mechanism which actuates the eccentric.

SUMMARY

There is provided a throttle pedal assembly comprising a base, a pedal pivotably mounted on the base, and a gear box coupled to the pedal. The gear box has a throttle wheel with a plurality of throttle cable terminal attachment locations and the gear box has a plurality of throttle cable mounting locations. A throttle cable is selectively and releasably attached to one of said plurality of throttle cable terminal attachment locations, and the throttle cable is selectively and releasably attached to one of said plurality of throttle cable mounting locations.

The throttle wheel may have an axis of rotation. The throttle cable terminal attachment locations may define an inner race and an outer race about the axis of rotation. The gear box may have a housing and a housing cover. The cable mounting locations may be keyed into a wall of the housing or a wall of the housing cover or both. The pedal may be coupled to the gear box by a cable actuation mechanism which drives the throttle wheel. The cable actuation mechanism and the throttle wheel may be disposed within a housing of the gear box. The base may include a base plate and a slider plate which is slidable relative to the base plate. The pedal may be mounted on the slider plate. The base may be provided with a detent to maintain the slider plate in a desired location relative to the base plate. An orientation point of the throttle cable may be adjusted by pivoting the gear box relative to the pedal.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be more readily understood from the following description of the embodiments thereof given, by way of example only, with reference to the accompanying drawings, in which:

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FIG. 1 is a front perspective view of a throttle pedal assembly;

FIG. 2 is another front perspective view of the throttle pedal assembly;

FIG. 3 is an exploded perspective view of the throttle pedal assembly;

FIG. 4 is a side elevation view of the throttle pedal assembly with a housing cover of a gear box removed;

FIG. 5 is a side elevation view of the housing cover of the gear box;

FIGS. 6A to 6D are side elevation views of the throttle pedal assembly with a housing cover of a gear box removed and a throttle cable attached to the throttle wheel and mounted to a cable mounting locations;

FIGS. 7A to 7C are side elevation views of the throttle pedal assembly as shown in FIG. 3 with an output orientation of the throttle cable adjusted; and

FIGS. 8A to 8C are front elevation views of the throttle pedal assembly as shown in FIG. 3 with an output orientation of the throttle cable adjusted.

DESCRIPTION OF SPECIFIC EMBODIMENTS

Referring to the drawings and first to FIGS. 1 and 2, there is shown a throttle pedal assembly 10 which generally comprises a base 12, a pedal 14 pivotally mounted on the base 12, and a gear box 16 coupled to the pedal 14. The pedal 14 is provided with a toe hook 18, in this example, but this is not required. The gear box 16 includes a housing 20 and a housing cover 22. There are openings 24 and 26 in the housing 20 through which a throttle cable 28 may extend. Referring now to FIG. 3, the housing 20 houses a cable mounting mechanism 30 and a cable actuation mechanism 32. The housing 20 and the housing cover 22 restrict the introduction of foreign material that may interfere with the operation of the throttle pedal assembly 10 and, in particular, with the operation of the cable mounting mechanism 30 and the cable actuation mechanism 32 when the throttle pedal assembly 10 is in use.

In this example, the cable mounting mechanism 30 includes a throttle wheel 34 having a plurality of throttle cable terminal attachment locations, for example, throttle cable terminal attachment locations 36, 38, 40, 42, 44, 46, 48 and 50 as defined below.

36	High Resolution Cable Terminal Attachment Location A
38	High Resolution Cable Terminal Attachment Location B
40	High Resolution Cable Terminal Attachment Location C
42	High Resolution Cable Terminal Attachment Location D
44	Low Resolution Cable Terminal Attachment Location A
46	Low Resolution Cable Terminal Attachment Location B
48	Low Resolution Cable Terminal Attachment Location C
50	Low Resolution Cable Terminal Attachment Location D

The cable terminal attachment locations 36, 38, 40, 42, 44, 46, 48 and 50 rotate about a fixed axis of rotation and relative movement between the cable terminal attachment locations 36, 38, 40, 42, 44, 46, 48 and 50 and defined cable pivot locations 52 and 54 generate linear motion of the throttle cable 28. The attachment of the throttle cable 28 to different ones of the throttle cable terminal attachment locations 36, 38, 40, 42, 44, 46, 48 and 50 enables the adjustment of the sensitivity and stiffness of the throttle pedal assembly 10. Each of the cable terminal attachment locations 36, 38, 40, 42, 44, 46, 48 and 50 is defined by a concentric circle that generates a moment arm about the rotational axis of the throttle wheel 34. The cable terminal

attachment locations **36, 38, 40** and **42** define an outer race. The cable terminal attachment locations **44, 46, 48** and **50** define an inner race. There is more sensitivity and higher perceived actuation load when the throttle cable **28** is attached to an outer race. There is less sensitivity and lower perceived actuation load when the throttle cable **28** is attached to an inner race.

The cable mounting mechanism **30** also includes a plurality of throttle cable mounting locations **56, 58, 60, 62, 64** and **66** as defined, for example, below.

56 30 Series Cable and Mercury Generation II Cable Mounting Location A

58 30 Series Cable and Mercury Generation II Cable Mounting Location B

60 OMC Cable Mounting Location A

62 OMC Cable Mounting Location B

64 Mercury Generation I Cable Mounting Location A

66 Mercury Generation I Cable Mounting Location B

Referring now to FIG. **4**, the throttle cable mounting locations **56, 58, 60, 62, 64** and **66** may be channels and/or keying features on an inner wall **68** of the housing **20**. There may also be strengthening ribs, for example, strengthening ribs **70** and **72** on the inner wall **68** of the housing **20**. There are, as shown in FIG. **5**, corresponding complementary throttle cable mounting locations **74, 76, 78, 80, 82** and **84** on an inner wall **86** of the housing cover **22**. The complementary throttle cable mounting locations **74, 76, 78, 80, 82** and **84** may likewise be channels and/or keying features. There may also be strengthening ribs, for example, strengthening ribs **88** and **90** on the inner wall **86** of the housing cover **22**. The throttle cable mounting locations **56, 58, 60, 62, 64** and **66**, on the inner wall **68** of the housing **20**, and the complementary throttle cable mounting locations **74, 76, 78, 80, 82** and **84**, on the inner wall **86** of the housing cover **22**, allow the throttle pedal assembly **10** to interface with commonly available marine grade push/pull cables, as shown in FIGS. **6A** to **6B**, which may be employed as the throttle cable without the need for aftermarket components.

FIG. **6A** shows a throttle cable **28a** which, in this example, is a 30 Series Cable mounted at mounting location **58** on the housing **20** by a retainer clip **92**. It will be understood by a person skilled in the art that the throttle cable **28a** is also mounted at mounting location **74**, shown in FIG. **5**, on the housing cover **22**. The throttle cable **28a** is connected to the throttle wheel **34** by a screw **94**. FIG. **6B** shows a throttle cable **28b** which, in this example, is a Mercury Generation II Cable mounted at mounting location **58** by the retainer clip **92**. It will be understood by a person skilled in the art that the throttle cable **28b** is also mounted at mounting location **74**, shown in FIG. **5**, on the housing cover **22**. The throttle cable **28b** is connected to the throttle wheel **34** by the screw **94**. FIG. **6C** shows a throttle cable **28c** which, in this example, is a Mercury Generation II Cable mounted by its barrel **96** at mounting location **66** on the housing **20**. It will be understood by a person skilled in the art that the throttle cable **28c** is also mounted by its barrel **96** at mounting location **82**, shown in FIG. **5**, on the housing cover **22**. The throttle cable **28c** is also connected to the throttle wheel **34** by the screw **94**. FIG. **6D** shows a throttle cable **28d** which, in this example, is an OMC Cable mounted by its barrel **98** at mounting location **62** on the housing **20**. It will be understood by a person skilled in the art that the throttle cable **28d** is also mounted by its barrel **98** at mounting location **78**, shown in FIG. **5**, on the housing cover **22**. The throttle cable **28d** is also connected to the throttle

wheel **34** by the screw **94**. It will further be understood by a person skilled in the art that, in other examples, the throttle cable mounting locations may be for other types of cables.

Referring back to FIG. **3**, the cable actuation mechanism **32** includes a segment gear **100** and a spur gear **102**. The segment gear **100** is rigidly mounted on the pedal **14** and the spur gear **102** is rigidly mounted on the throttle wheel **34**. The spur gear **102** and the throttle wheel **34** are concentrically and rotatably mounted on a shaft **104** which is coaxial with the axis of rotation. The segment gear **100** engages the spur gear **102** and pivoting of the pedal **14** accordingly rotates the throttle wheel **34** which, in turn, moves a terminal end of the throttle cable **28** through a defined arc segment. This movement, together with the virtual axis of the throttle cable **28**, results in linear motion of the throttle cable **28** to throttle an engine.

FIGS. **7A** to **7C** show that the base **12** of the throttle pedal assembly **10** includes a base plate **106** and a slider plate **108**. The base plate **106** is provided with rails **110** and **112** which receive the slider plate **108**. The base plate **106** is configured to be mounted on a floor of a vehicle, for example a marine vessel, and the slider plate **108** is able to slide relative to the base plate **106**. The pedal **14** is mounted on the slider plate **106** and is accordingly also able to slide relative to the base plate **106**. This allows the pedal to be positioned in a desired location relative to the base plate **106**. The throttle pedal assembly **10** is further provided with a detent, in form of a locating boss **114**, which engages with the base plate **106** and the slider plate **108** to maintain the pedal **14** in a desired position. The locating boss **114** may be released to allow the pedal **14** to be re-positioned and the locating boss **114** may be subsequently re-engaged to maintain the pedal **14** in position. This allows the throttle pedal assembly **10** to be mounted in different configurations.

An output orientation of the throttle cable **28** may also be adjusted by pivoting the gear box **16** as shown in FIGS. **8A** to **8C**. For example, the output orientation of the throttle cable **28** may be routed rearward towards a stern of the marine vessel as shown in FIG. **8A**, or upward into a console or gunwale as shown in FIG. **8B**, or forward toward a bow of the marine vessel as shown in FIG. **8C**. This allows the throttle pedal assembly **10** to be mounted in different configurations.

It will be understood by a person skilled in the art that many of the details provided above are by way of example only, and are not intended to limit the scope of the invention which is to be determined with reference to the following claims.

What is claimed is:

1. A throttle pedal assembly comprising:

a base;

a pedal pivotably mounted on the base; and

a gear box coupled to the pedal, the gear box having a throttle wheel with a plurality of throttle cable terminal attachment locations and the gear box having a plurality of throttle cable mounting locations, wherein a throttle cable is selectively attached to one of said plurality of throttle cable terminal attachment locations and the throttle cable is selectively attached to one of said plurality of throttle cable mounting locations.

2. The throttle pedal assembly as claimed in claim 1 wherein the throttle wheel has an axis of rotation and said of plurality throttle cable terminal attachment locations define an inner race and an outer race about the axis of rotation.

3. The throttle pedal assembly as claimed in claim 1 wherein the gear box has a housing and a housing cover, and

the cable mounting locations are keyed into a wall of the housing or a wall of the housing cover or both.

4. The throttle pedal assembly as claimed in claim 1 wherein the pedal is coupled to the gear box by a cable actuation mechanism which drives the throttle wheel. 5

5. The throttle pedal assembly as claimed in claim 4 wherein the cable actuation mechanism and the throttle wheel are disposed within a housing of the gear box.

6. The throttle pedal assembly as claimed in claim 1 wherein the base includes a base plate and a slider plate 10 which is slidable relative to the base plate, and the pedal being mounted on the slider plate.

7. The throttle pedal assembly as claimed in claim 6 wherein the base is provided with a detent to maintain the slider plate in a desired location relative to the base plate. 15

8. The throttle pedal assembly as claimed in claim 1 wherein an output orientation of the throttle cable is adjusted by pivoting the gear box relative to the pedal.

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